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ABSTRACT

This document reports on research in progress on the nature and dimensions of careers. Following a brief introduction, the second section develops and illustrates new concepts and measures for analyzing career lines. The following concepts are defined in terms of the chosen conceptualization: job, career, career lines (regularities in job sequences affecting significant numbers of workers over their work histories), and entry portals (jobs through which a significant portion of the labor force gains access to a career line). Measurement and construction of career lines through data and analysis strategies are discussed in terms of several methodological issues. The illustration of elementary school teachers is used as an empirical example of the career lines that originate with placement as a teacher at age 18-22 in 1965. The third section provides a prospective research agenda (1) for searching for the structure and salient dimensions that characterize the full set of career lines and (2) for establishing the determinants of individual access to careers. Specific topics include dimensions and structure of career lines, determinants of individual access to careers, and design and data for individual-level measures. A sixteen-page listing of references is appended. (YLB)

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Careers and Career Lines:

Concepts, Measures and Explanations

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U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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The Boys Town Center for the Study of Youth Development

Boys Town, Nebraska

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Career Development is a project of The Boys Town Center for the Study of Youth Development.

The Center was established in 1972 by Father Flanagan's Boys' Home. Staff operations began in the fall of 1976. The Center seeks to conduct significant research and provide useful knowledge that is relevant to the design of social policies and rehabilitation programs for youth and families.

The Career Development Project represents a long-term institutional commitment to the generation and dissemination of career development information. The project is currently examining the process by which individuals enter careers. The project is directed by Dr. Luther B. Otto. He is assisted by Drs. Vaughn R. A. Call and Kenneth I. Spenner.

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Careers and Career Lines: Concepts, Measures and Explanations

I. Introduction

In 1976 the National Institute of Education initiated a comprehensive study to determine progress in identifying and assessing competencies required for job performance. Among the major findings that emerged was that a number of individual skills and abilities are useful and important in a wide variety of occupations.

The notion that personal traits relate to job dimensions is not new. Indeed, the matching people with jobs, or trait-factor assumption, is traceable to Parsons' (1909) three-step formula--know yourself, know the work situation, and match the two--that set the agenda for career guidance for the next 70 years. But the NIE assessment suggested that the perspective had shifted to preparing individuals for careers, not jobs. The new perspective assumed that job changes could be related in terms of dimensions of work identified through job analyses. The review concluded that "whatever else a career is or is not, it most often implies several jobs or occupations over an individual's lifetime"; and "to prepare for a career... implies being ready for several jobs or occupations" (National Institute of Education, 1977:3).

Given that some jobs lead to other jobs and that strings of jobs form careers, several questions surface. The first is descriptive: What sequences of jobs or career lines exist in the world of work? The second question is analytical: Why do certain jobs lead to other jobs? Why not to others? Further, what patterns or structures exist in career lines in the American ecoromy? What are the salient dimensions differentiating

career lines? What predicts individual access to types of career lines? Our research is designed to inform these questions.

This chapter reports on research in progress on the nature and dimensions of careers. The chapter is divided into two major sections. First, we develop and illustrate new concepts and measures of careers. Second, we present a prospective research agenda for analyzing questions of structure and dimensions in career lines and for establishing the determinants of individual access to careers. We conclude with describing the design of the study and the data on which our individual-level measures are based.

II. Concept and Measures for Careers

Old and New Concepts

The historical roots of contemporary notions about careers span the past half century. Sorokin (1927) believed that regularities in job sequences occur over the work histories of individuals. Davidson and Anderson (1937) initiated research on career patterns a decade later. About the same time, Buehler (1933) identified five psychological life stages: the growth stage, exploratory stage, establishment stage, maintenance stage, and a final stage of decline. Miller and Form's (1949; 1951) sociological classification of work stages largely corresponded to the age limits of Buehler's life stages (Super, 1957:71) in distinguishing the preparatory work period, initial work period, trial work period, stable work period, and finally the retirement period. Miller and Form examined whether the sequences in the work periods were patterned in different ways for various occupational and socioeconomic groups. Four types of career patterns were noted: stable career patterns in which persons went directly from school into a type of work they consistently followed; conventional

career patterns in which individuals progressed through initial and trial periods en route to stable employment; unstable career patterns in which stable work periods were interrupted by trial work periods; and multiple-trial career patterns that featured frequent changes of employment without a dominant work period. Further, Miller and Form displayed the relationship between father's education and father's occupation, father's occupation and son's education, and son's education and son's occupation in their career patterns. Miller and Form's research was noteworthy in defining careers in terms of work histories rather than jobs held at some point in time. The definition of careers did not denote upward mobility to the exclusion of other types of career patterns and their study included examinations of the determinants of careers. There have been subsequent empirical descriptions of careers (Lipset and Bendix, 1952a; 1952b; Palmer, 1954; Spilerman and Miller, 1973; Sorensen, 1975; Parnes and Nestel, 1974; Wilensky, 1961; and Thompson, Avery and Carlson, 1968). Nonetheless, apart from Spilerman (1977, discussed below) there are few attempts to systematically type and describe the variety of career lines that occurs in the labor market on the basis of empirical data.

Not only are there few empirical studies of careers, there is also little agreement on the meaning of the concept that so regularly occurs in the economic, psychological, sociological, and vocational guidance literatures. Typically career neither denotes nor connotes a work history or succession of jobs over time. Usually the term is used synonymously with job or occupation. Those who incorporate the notion of job succession in their definitions differ on other requirements of the definition. Thus, Slocum (1974:5) asserts that occupational careers involve "an orderly sequence" of development and "progressively more responsible roles within

an occupation." Hall (1975:267-8) states that a normal career involves progressively higher income and prestige. A more recent theory of occupational careers (Sorensen, 1974; see also Sorensen, 1977; and Hudis and Kalleberg, 1977) uses the job shift as the basic datum for analysis of earnings and socioeconomic differences across individuals. Subsequent work includes those who stay in the same job over time (Kalleberg and Hudis, 1979). An even more typical approach to the study of careers is Temme's (1975) discussion that provides reasonably specific definitions for work, jobs, and occupations but leaves the precise meaning of careers undefined.

Spilerman (1977) observes that past studies have focused largely on preparation for work, securing entrance into occupations, remuneration and rewards, mobility, occupational associations, and phasing into retirement. Spilerman criticizes the literature for selectively studying careers--e.g., orderly careers--and for its reliance on case histories of individual occupations, firms, or industries to the general neglect of careers that cross institutional boundaries. In addition we note that there has been little effort to describe the multi-dimensional characteristics of careers or to predict and explain their differential accessibility within populations.

We seek a conceptual and operational definition of careers meeting these requirements. The concept should embrace the entire civilian labor force, not merely a single occupation, industry, or firm. The concept must allow for the empirical study of female as well as male careers. The concept should incorporate the dimension of time (age) and allow statements about work histories, not just job occupancy at a single point in time. The concept ought to be sensitive to a variety of institutional structures around which work roles vary (e.g., occupation, industry, firms) rather

than granting exclusive priority to a single institutional axis. Further, the concept should provide for an examination of various job characteristics, not only occupational prestige and economic remuneration. The concept must avoid the evaluative trappings of past definitions of careers that denote upward social mobility to the exclusion of other types of career lines. Finally, the definition, conceptualization, and analytical treatment of careers ought to be based on empirically verified work histories.

Our conceptualization is informed by Spilerman's (1977) discussion of careers. We think of jobs as a set of work roles or positions that have requirements for entry, imply a set of routines that characterize the content of the work role, and provide rewards for work role performance (see Temme, 1975; Wise, Charner and Randour, 1976; Spenner, 1977). Following Spilerman (1977:551ff.) we define a career as an individual's sequence of jobs over time. The concept career line is informed by the observation that determinable regularities in job sequences exist and affect significant numbers of workers over their work histories. Career lines have identifiable work-related consequences for their incumbents; and there are empirical regularities that govern access to career lines through a limited number of jobs. Following Kerr (1954), Spilerman refers to these jobs as entry portals. Career lines, then, are structural features of the labor market and are subject to the formative influences of industries, firms, and occupations whereas careers are individuals' work histories. Career line sets comprise of all separate and distinct career lines originating from an entry portal job.[1] Treating career lines as empirically linked

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[1] Equivalently, career line sets refer to all separate and distinct career lines leading to a job. The distinction between lines originating from versus leading to a job corresponds to outflow and inflow displays, respectively, in any job transition (mobility) matrix.

sequences of jobs goes beyond traditions in economics (human capital) and sociology (status attainment) that give only selective attention to job linkages (e.g., occupational industry based lifetime earnings profiles).

It is important to distinguish conceptually between an entry portal and any other particular job that an individual may hold (e.g., first job, current job, job at a specific age, or job at mandatory retirement). Entry portals, like career lines, are not individual level but are structural phenomena. An entry portal is a job through which a significant proportion of the labor force gains access to a career line. Entry portals are variable with respect to their age-width. Some career lines have entry portals that are narrow age-width openings. For example, unless one is a physician at age twenty-five to thirty-three, lengthy training requirements and medical school policies largely preclude the individual from becoming a specialized surgeon. Other career lines may have very broad age-width entry portals. For example, one may become a truck driver over a considerable number of years. The jobs that individuals hold--be they first, second, or last--vary in the extent to which they grant individuals access to one or more career lines.

Inasmuch as entry portals control access to career lines, they portend the expected job sequences and consequences or rewards for workers located in that position at a given time in their life course. Focusing on entry portals provides for examining a number of questions central to the proposed research. For example, in their aspirations and eventual labor force entry, to what extent do young adults select not only a job but also one or more career lines implicated in that job choice? Which entry portals offer the greatest flexibility (i.e., skill generalizability or other career

lines) at a later date? Which aspects of one's family background, educational and military histories have significant bearing on accessibility to certain types of entry portals and movement through career lines?

The strategy of focusing on entry portals assumes that individuals selecting jobs in the early years of their labor force participation are at the same time, whether consciously or not, choosing jobs that have later career consequences. Limited information from the status attainment research suggests that this is not an unreasonable assumption (Blau and Duncan, 1967; Kelley, 1973; Featherman, 1973), although the mechanisms involved in the process are neither well understood nor exhaustively examined.

Measuring Career Lines

Suppose one had the ideal data for measuring career lines. What would such a data set look like? The ideal data set would be taken from a large number of individuals over their complete work histories and life courses. It would contain enough cases and sufficient detail to measure jobs and career lines within and between firms. (Note that we have already far exceeded the reality of any existing data set.) Further, in order to assess historical changes (period and cohort effects) in the structure of career lines, our data set would include multiple panels five or ten years apart, with each panel followed over its worklife. Even if such a data base existed, the conclusions it generated would likely refer to a labor market of ten, twenty, or more years earlier that may not accurately characterize career entry for current cohorts due to the effects of inflation, migration, growth and decline in opportunities, and the like.

Lacking the ideal data base along with the implied "motion picture" of evolving career lines, we estimate career lines with existing cross-sectional data. A synthetic cohort strategy takes age-graded "snapshots" of labor force transitions at one point in time for workers of various ages. By stringing together consecutive snapshots, a synthetic version of the true career line can be estimated under simplifying assumptions.

A career line is operationally defined as a post high school job sequence for successive five-year age cohorts experienced by a non-trivial portion of the labor force. Informed by Spilerman's (1977) estimation procedures, we estimated the empirically occurring career lines based on the cross-sectional synthetic cohort information provided in the 1970 census public use samples (US Bureau of the Census, 1972). The combined three percent neighborhood, county and state public use sample numbered about 3.3 million cases. The population from which the sample was drawn is defined as individuals aged 23-62 in 1970 and aged 18-57 in 1965. Additionally, we restrict analysis to those individuals reporting a codable occupation and industry in 1965 and 1970 ($N \tilde{=} 1.874$ million). We divided the sample into eight five-year age cohorts (ages 18-22, 23-27, ..., 53-57). Given the set of job categories discussed below, we constructed a three-dimensional array of 1965 job origins by 1970 job destinations by age cohorts.

The elemental components of career lines are jobs. Job refers to the 1970 six-digit detailed census occupation-industry classifications (US Bureau of the Census, 1970). In order to make the 1970 census classifications manageable and of sufficient numerical size to develop stable estimates of transition probabilities, we reduced the 421 three-digit

census occupations and 221 industries to 384 occupation-industry categories. The categories were constructed to maintain compatibility with the 1970 census job codes and to maximize within-category homogeneity.

The 384 categories were constructed in a five-step process. First, we examined univariate marginals for all three-digit occupations and industries for 1965 and 1970 jobs. Second, in the case of very large ($N > 4000$) or small ($N < 1000$) categories, we also examined six-digit occupation-industry marginals. Third, preliminary occupation-industry breakdowns and combinations were made and critically reviewed. Instructive precedents were provided by the 1970 industrial classifications and categories earlier constructed by Temme (1975). Means and variances of DOT characteristics for census categories were also helpful (Spenner and Temme, 1977). Fourth, we critically examined the two-dimensional table of categories for 1965 and 1970 jobs, each cross-classified by age. Finally, we adjusted, revised, and rechecked the job categories until a satisfactory final set was obtained.[2]

FIGURE 1 ABOUT HERE

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[2]Transforming the 1970 three-digit census occupations into job categories resulted in 165 job categories that remained identical to the 1970 three-digit census occupation codes. For these categories 70 industry breakdowns were made. One hundred and sixty-six 1970 three-digit occupation categories were collapsed into 53 occupation categories with no industry designations. Finally, ninety 1970 three-digit occupation categories were collapsed into 34 which, in turn, were broken by industry to form 160 categories. Most of the resulting categories (95 percent) have 1000 to 5000 1965 respondents with at least 50 cases per age cohort. A small number have many more cases (e.g., elementary school teachers) where further industry breaks were not possible. A few categories have fewer than 50 respondents in some age cohorts (e.g., airline stewardesses, railroad conductors) where the job category is highly age-skewed.

Career line sets consist of all career lines originating in a single entry portal that exceed a branching criterion (discussed below). These were constructed by linking consecutive five-year interval job transitions reported by successive age cohorts (see Figure 1). For example, beginning with the cohort aged 18-22 in 1965, we calculated the probabilities of moving from each job category in 1965 to each job category in 1970. The 1970 destination job category for the 18-22 age cohort in 1965 was then used as the 1965 origin job category for those in the cohort aged 23-27, and job transition probabilities were again calculated. This process continued for each of the eight age cohorts. The procedure yielded a career line or sets of career lines for every origin position. The iterations were repeated until the branching criteria were exhausted for all categories in each stage.

Although it was technically possible to compute probabilities for all transitions over the eight successive five-year periods, substantively such analysis would be neither meaningful nor necessary. In the extreme case it would mean that if but one individual changed from job X to job Y from 1965 to 1970, that transition would be defined as an element of a career line. We established decision rules to designate when a particular job transition occurred with sufficient probability and frequency that it could be considered a meaningful component of a career line.

Spilerman (1977:561) addressed the same issue as follows:

> In this representation, a branch to a new position is defined when, say, 12 percent of a cohort in the origin status have made the transition. The incline is begun when, say, 3 percent of the workers have made the shift and terminated when, say, 9 percent of the workers have made the shift....[T]he same transition may be repeated at a later time if the branching criterion is again satisfied.

Our intent was to arrive at a balance between detail in career lines (the larger the number of career line possibilities, the fewer the cases upon which they could be based) and the level of detail in job categories. Upon reflection we decided that a decision rule should include both a specified percent of the total incumbents in a 1965 job category that change to a 1970 category. Additionally, there should be a minimum number of cases that made the change over the five-year period if the transition was to be regarded as nontrivial. The issue is that of establishing the amount of change in the labor force required before a job transition can realistically be considered to be a meaningful component of a career line. As the decision rules are relaxed, the number of transitions increase and career line sets become more complex. As stricter decision rules are employed, the opposite consequences follow.[3] To illustrate career line sets below, our decision criteria are transition probabilities (P_{ijk}) $\geq$ .04, and transition frequencies (f_{ijk}) $\geq$ 10 individuals.

Methodological Issues

The data and analysis strategy that are used to construct career lines embody several methodological issues. Specifically, they are:

1) the validity of Markov assumptions;
2) the validity of steady-state assumptions for work and the structure of career lines over time;
3) the confounding effects of marginal changes in the occupational structure;
4) the measurement error in retrospective job reports; and

[3]Our software permits specifying alternate decision rules.

5) other institutional axes that structure career lines (i.e., firms and regional labor markets).

We consider the issues in sequence.

Use of a synthetic cohort requires making an assumption about the irrelevance of a worker's earlier job history to his or her present opportunities and future prospects--i.e., only the previous point-in-time job enters the estimation of transition probabilities (Mayer, 1972; Rosenbaum, 1978; and Spilerman, 1977). For a worker age 45 in 1970, we assume that the entire effect of his or her prior employment history including seniority, tenure, and skill acquisition is captured in the measurement of his or her 1965 job at age 40. Equivalently, individuals in the same detailed jobs in 1970 and 1965 are assumed to have equal job histories.

Undoubtedly, this assumption introduces some level of distortion in the estimation of transition probabilities for career lines. Markov models are acknowledged as offering a poor fit for intergenerational mobility and at best provide an improved but loose fit to intragenerational mobility (Mayer, 1972). Hodge (1966), using a sample of men age 35-64 from six cities with longitudinal data on occupation in 1940 and 1949, finds the Markov assumption introduces 4 to 7 percent distortion in transition probabilities for highly aggregated occupation groups. Whether this level of distortion is large or small depends on the alternatives. In our case, lacking an estimation alternative, we chose to proceed recognizing the limitation and trying to assess its effects.

Additionally, use of a synthetic cohort requires a "steady-state" assumption with respect to the nature of work and jobs and in the stability of the transition probabilities through recent history. This assumption, too, is not completely true and introduces some distortion in the estimated

career lines. Theoretical arguments about temporal changes in work content have ranged from "no change" through "the degradation of work in the 20th Century" thesis to "the upgrading of the content of work as a function of technological change and automation" arguments (Hall, 1975:314-322; Braverman, 1974; Edwards, 1979; Report of a Special Task Force to the Secretary of HEW, 1973; Eckaus, 1973). The little systematic empirical evidence that is available suggests that net of changing distributions of workers to jobs, true change in the skill content of jobs in the last 30 years has probably been very small (Spenner, 1979).

A similar conclusion may be fair regarding temporal changes in transition probabilities. Featherman and Hauser (1978:214) conclude that essentially there is temporal constancy in the mobility regime for American men between 1962 and 1973 given adjustments for the varying marginal distributions of workers to aggregate occupation categories over the years. Nonetheless, they report very small but statistically significant changes in the transition probabilities that link first jobs to current jobs between 1962 and 1973. But the size of the net change is only one and one-half percent of the total association in a full (10 x 10) mobility table. Again, lacking a better option, we proceed with caution.

A further confounding effect that may distort transition probabilities concerns compositional changes in the occupational structure as well as changes in the age and industry structure. There have been sizeable changes such as declines in farming and manufacturing accompanied by growth in clerical and professional occupations. There has been growth in the nation's economy. In theory, these problems can be remedied in large part by adjusting the data for marginal changes in the job structure (Hauser, et

al., 1975a; 1975b; Deming, 1943; Goodman, 1970). We are investigating the feasibility of such adjustments.

One potentially important measurement issue with census data is whether retrospective reports of jobs (occupation and industry held five years earlier) are accurate and useful. Important recent work on the topic (Hauser and Featherman, 1977:57) concludes that "memory of occupation is not subject to much more decay in the long run (5 years) than it is in the short run (several months), as witnessed by the similarity of reliability (.8726) and stability (.8020) correlation coefficients." More important, the error structure in retrospective reports, particularly for nonblacks, is random with respect to background variables, education and current occupation (Bielby, 1976; Bielby, Hauser, and Featherman, 1977a; 1977b). In sum, recent work suggests that measurement error in retrospective reports of jobs is not a serious problem for the estimation of career lines.

Finally, our initial estimates of career lines leave unspecified the effects of certain institutional axes such as regional labor markets and career patterns within firms insofar as these are not captured by our occupation-industry categories. Spilerman (1977) estimates career lines from census data for six northeastern U.S. metropolitan areas. The cost of such regional restrictions on estimates is a severe reduction in sample size that reduces the reliability of transition probabilities. This is not to say that regional variation is unimportant. Rather, we opted for increased reliability and cases over regional variations in career lines. That career lines are structured and operative within firms even though the individual may be in the same occupation and industry over his or her entire worklife is a more serious bias in our estimates (for reviews on

intrafirm career structures see Doeringer and Piore, 1971; Baron and Bielby, 1979; Collins, 1979). The current round of estimation does deal with intrafirm variations. However, analyses by others (Baron and Bielby, 1979; Rosenbaum, 1979) and analyses that we hope to perform (outlined below) will give attention to the ways in which career lines are embedded in firms.

In summary, our approach to these methodological problems is pragmatic. We acknowledge the problems. Where we can do something about them we will. Where we cannot we proceed with caution. Given our bias for dealing with empirical data, the various assumptions are calculated decisions that entail risks. We proceed in the belief that the new set of concepts, however crudely operationalized, will offer explanatory and predictive power that will advance our understanding of careers.

Elementary School Teachers: An Empirical Example

Figure 2 graphically displays an empirical example of the career lines that originate with placement as an elementary school teacher at age 18 to 22 in 1965. The figure labels the jobs that occur in elementary school teacher career lines, extends the construction of career lines through all eight synthetic cohort stages, and graphically portrays the significant job changes ($P_{ijk} \geq .04$, $f_{ijk} \geq 10$) that occur within the cohorts.

FIGURE 2 ABOUT HERE

Two numbers for each job transition quantify the amount of movement between the job categories in 1965 and 1970. The percentages indicate the proportion of the total number of cases in the 1965 job-age group that made

the transition to a particular 1970 job category. For example, 67 percent of the elementary school teachers aged 18 to 22 in 1965 continued as elementary school teachers in 1970; and 12 percent of the elementary school teachers aged 18 to 22 in 1965 changed to secondary school teachers over the same five-year period. The number in parentheses indicates the number of cases represented by the percentage. Thus, 1,818 elementary school teachers in the age group 18 to 22 in 1965 were also classified as elementary school teachers in 1970. Similarly, 319 changed to secondary school teachers over the same period. Both the percentage and the number of cases in a given transition are based on the actual number of cases in an age group that were in a job category in 1965 and made the transition to a 1970 job category.

Elementary school teacher career lines illustrate several concepts. First, the figure graphically portrays a set of career lines. Figure 2 embodies forty-four different combinations and permutations of job changes each presenting a career line possibility. Career line sets from other job origin positions show quite different patterns. Some sets contain many more lines; others contain just one line. The transition probabilities vary from one set of lines to another. Finally, the age-width of entry portals and the age or life course location of entry portals varies systematically between sets of lines.

The career lines for elementary school teachers illustrate the variability in the age-width of entry portals. At any age elementary school teachers change to secondary school teacher positions. The percent of elementary school teachers making the transition is relatively constant, 11 percent to 16 percent over the career span. Thus, elementary school teaching provides a wide entry portal to secondary school teaching. By

comparison a significant number and proportion of elementary school teachers become school administrators only in the age 28 to 32 cohort at which time 4 percent make the transition. Statistically, elementary school teaching offers a very narrow entry portal to school administration. The change occurs in only one five-year period and then in a very small amount. One is tempted to also observe that secondary school teaching is a very narrow entry portal to both school administration and elementary school teaching, and that college teaching-other subjects is an open entry portal to college teaching-natural sciences, whereas the latter is not an entry portal to the former. While probable, these conclusions would be premature inasmuch as they are not based on job change information for job categories in the early cohorts. Such information is available only by referencing the complete career line information for the appropriate job categories.

Elementary school teacher career lines are patterned. Elementary school teachers tend to remain elementary school teachers across age cohorts, as is also the case for the other job categories represented in Figure 2. Typically, from two-thirds to three-fourths of the elementary school teachers stay in elementary school teaching positions over successive five-year periods. The percentage who remain elementary school teachers systematically increases from about 60 percent to nearly 80 percent after age thirty-two. Indeed, after age thirty-two the options open to elementary school teachers are limited to secondary school teaching. Prior to age thirty-two, elementary school teaching provides a wide entry portal for secondary school teaching and narrow but significant entry portals to college teaching, both other subjects and natural sciences, and school administration.

Further study of the career lines set for elementary school teachers reveals other interesting patterns. First, note that the display is highly successful in capturing most of the job changes affecting elementary school teachers. Typically, the probabilities account for 80 to 90 percent of the job transitions for elementary school teachers in a given age group. Thus, 67 percent remain elementary school teachers and an additional 12 percent change to secondary teaching which accounts for 79 percent of the job changes experienced by elementary school teachers aged 18 to 22 in 1965. In the later cohorts nearly 90 percent of the job changes are captured. This means that 21 percent of the first cohort or as little as 12 percent and 13 percent of the later cohorts change to "other" positions or left the labor force. What those other jobs are could be determined by relaxing the decision rules to allow tracing all changes to other categories. Indeed, the number of job categories included in this residual is itself interesting and would inform other analysis; however, such discussion goes beyond our present purposes.

Second, this analysis is based on the entry portal strategy applied to the case of elementary school teachers. It traces the career implications of being an elementary school teacher in every age cohort, aged 18 to 57. It is not a complete statement for other job categories that appear in the figure. For example, from Figure 2 we learn nothing about the career lines for school administrators prior to age thirty-three. Were one interested in the career lines of school administrators it would be necessary to follow the same entry portal analysis as we have here illustrated for elementary school teachers.

Third, the percentage and numerical indicators associated with each job change in this illustration provide three kinds of information. They

quantify the amount of change as discussed above. They provide a basis for reconstructing the total number of persons in the 1965 sample by job categories, which was also discussed above. Finally, they provide the basis for looking at the relative contraction, expansion or stability of job categories over time. Consider the meaning of the association of larger percentages with smaller numbers in the later cohorts. Essentially, the combination indicates that fewer elementary school positions are filled by individuals from older cohorts. Similarly, smaller percentages associated with larger numbers in an early age cohort indicate that relatively more positions are filled by individuals in that cohort. Embedded in the numbers indicating the amount of job change for specific cohorts is information on the relative size of the work forces drawn from age cohorts in a particular job category.

The entry portal strategy displays the implications of being in a particular job at a given time and how position and age bear upon subsequent job transition probabilities. The entry portal strategy is not designed to trace the job origins of persons who, for example, are elementary school teachers in the age 53 to 57 cohort. Such information is available but requires an alternative analysis strategy.

III. Career Line Research

In the first section we developed concepts and measures for analyzing career lines. In this section we provide a prospective research agenda for searching for the structure and salient dimensions that characterize the full set of career lines and for establishing the determinants of individual access to careers. The two areas of research draw on separate bodies of data: the first on career lines and job characteristics estimated from

census data, and the second on a panel study of a statewide sample of 1966-67 high school juniors and seniors that is described below. The two lines of research inform one another. One goal of the research on dimensions and structure is to generate dependent variables that operationally define "access to career lines." The variables that differentiate, structure and define dimensions of career lines will be estimated for age-specific entry portals. The explicit linkage between data sets involves merging these variables to records in the individual data on the basis of respondents' age-specific jobs. Individual-level explanations can then be used to model and explain variation in the structurally-based variables that define access to career lines.

Dimensions and Structure of Career Lines[4]

Gross, Mason and McEachern (1958:17) note that uses of the concept "role" engender three basic ideas, namely, that individuals "(1) in social locations (2) behave (3) with reference to expectations." Work roles have requisites for entry and carry expectations for behavior with respect to role content and offer rewards for occupancy and performance. The dimensions of jobs refer to the distinct features of work roles by which jobs are differentiated. The central issues can be framed by several questions. What dimensions of jobs are important over the careers of individuals? What is the relationship between dimensions, how do societal structures generate these relationships, and how might they be changing? More generally, how is work organized into jobs, occupations, industries,

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[4]This section draws upon materials presented earlier by Spenner and Otto (1979) at the American Sociological Association meetings, Boston.

and career lines (Davis and Taylor, 1976; Braverman, 1974; Baron and Bielby, 1979).

In certain respects these are classic questions rasied by Marx, Durkheim, and Weber. For example, in Marxist studies of the class structure (Parkin, 1971; Giddens, 1973; Wright and Perrone, 1977) unit relationships of control over production prevail as paramount dimensions of the social organization of work. Neoclassical economics would explain internal job structures in terms of the production function: considerations of productivity and scarcity determine the nature of jobs and internal promotion ladders. In studies of status attainment and mobility, socioeconomic status, as concept and as measurement metric, is the major stratification dimension (Klatzky and Hodge, 1971; Featherman and Hauser, 1977). And the effects of occupational role on psychological orientation show the prominence of occupational self-direction as the organizing dimension (Kohn, 1969; Kohn and Schooler, 1978; Miller, Schooler, Kohn and Miller, 1979).

Identifying the appropriate dimensions of jobs and careers is an issue that has not been resolved. The more general concepts and measures, such as socioeconomic status and prestige, inform the study of stratification and intergenerational status transmission but do not provide the necessary detail for analyzing the dynamics of intragenerational job choices and shifts. Dimensionality and social organization of jobs is important because the understanding, definition and mixture of individual definitions of costs and rewards likely varies as a function of age, family, other role responsibilities and career line location. Moreover, undoubtedly the dimensions and mix of job dimensions specific to certain classes of career lines are in some measure organized by their location in dual and segmented

labor markets (Doeringer and Piore, 1971; Althauser and Kalleberg, 1977; Kalleberg and Sorensen, 1979).

How do we begin to address the challenge to specify the social organization and important dimensions of jobs and careers? Several recent studies provide a beginning, but also raise additional questions. We identify the major efforts and focus on the unresolved questions.

In a recent contribution, Baron and Bielby (1979) identify several unresolved issues in structural explanations of work organization. Much of the new "structural" stratification research proceeds without a clear notion of structure and without consensus on which structures to study. The existing literature fails to give adequate consideration to alternate explanations for economic segmentation, and current research fails to generate competing testable hypotheses from the two major perspectives (e.g., the neoclassical theory of the firm versus segmented labor market theories). Baron and Bielby (1979), for example, urge refocusing research on firms as the unit of organization, suggesting that firms will yield a more meaningful picture of the structure of work than that provided by occupational or industrial data. They argue that the basic questions will continue to guide research during the 1980s: To what extent is there economic segmentation of labor markets? Given economic segmentation, what are its underlying components and dimensions? What is the effect of segmentation on work organization within firms? And, what is its trend? Our concern with career lines appends two additional questions: Assuming its existence, does economic segmentation determine the shape and salient dimensions of career lines? Alternately, does classic economic theory of the firm offer better fitting predictions about the dimensions of jobs and careers?

While studies of economic segmentation offer one approach to questions of social organization and dimension of jobs and careers, other literatures also address the topic. The program of research by Kohn and colleagues (Kohn, 1969; Kohn and Schooler, 1973, 1978; Miller, et al., 1979) provides the most sustained and systematic sociological program of research that examines a large array of detailed job characteristics. Using size of effects of occupational conditions on psychological functioning as the criterion and controlling for job status, they find the largest net effects for occupational self-direction variables: substantive complexity of work, routinization and closeness of supervision.

Other recent studies draw upon both inductive and deductive strategies in generating dimensions for jobs from a large array of job characteristics. Temme (1975), in a conceptual and empirical treatment of occupation, and Spenner (1977), in a study of the intergenerational transmission of the components of jobs, use a tripartite conception of labor force positions: requirements (requisites), routines (job content), and rewards. Bielby and Kalleberg (1975) and to a lesser extent Mortimer (1974) inductively arrive at related dimensions: requirements, resources, rewards, and work autonomy, functional foci, and characteristic rewards, respectively. Yet other studies also using inductive and deductive strategies arrive at other dimensions for jobs. Thus, Spaeth (1979) produced three highly correlated vertical dimensions: prestige, authority and complexity. Kalleberg (1977) provides six dimensions of a theory of work values and job satisfaction. Vanneman and McNamee (1978) present three dimensions in their study of labor force characteristics and job rewards.

These studies raise several additional issues. First, consensus is lacking on what constitutes the appropriate domain of job characteristics

that generate or reflect the dimensions of jobs and careers. The literatures identify in excess of 100 features of jobs (perhaps 15-30 major ones) and problems of conceptualization and data reduction must not be underestimated. Second, the studies uniformly show that jobs are constellations of modestly to highly correlated characteristics, creating the estimation problems that accompany the separation of colinear effects. The presence of constellations of job features emphasizes the need for stronger theoretical and measurement models that speak to the question of what it is about jobs that is important and why. Finally, the accumulated literature discourages the notion that there is a single dimensionalization, or single theoretical statement, or a single measurement model of jobs and the social organization of jobs that will fit all substantive problems at a disaggregated level of analysis. Rather, at least in the near term our theories and measurement models for career and job dimensions will probably be most effective if they are tailored to more narrowly defined classes of substantive problems such as those dealing with structural and labor market forces operating on jobs, or those dealing with such individual perceptions of jobs as job satisfaction and aspirations. This seems to be a reasonable strategy until we have a better understanding of the dimensions and social organization of jobs and careers for sociologically similar questions, whereupon we may have achieved the leverage needed to address larger issues of synthesis.

Our analysis of job and career dimensions will be informed by over 70 characteristics of work roles and work role incumbents for each of the 384 1970 census occupation-industry categories. For illustrative purposes, Table 1 reports mean estimates on the characteristics for elementary school teachers and for the U.S. civilian labor force, age 23-62 in 1970. The

TABLE 1 ABOUT HERE

estimates are taken from two sources. Scores for work role content variables are weighted estimates for the U.S. labor force based on the Dictionary of Occupational Titles information (U.S. Department of Labor, 1965). Estimation and measurement details are reported in Spenner (1980). The remaining variables, indexing the requirement, reward and compositional variation in jobs, were estimated from the census public use sample described earlier. For example, compared to the entire labor force, elementary school teaching involves more complex work with data and people, less complex work with things, greater use of cognitive and perceptual aptitudes, more vocational training, much more variety in work, generally sedentary work in terms of physical demands and, overall, much more complex work than that entailed in the average job. Further, elementary school teachers are 82 percent female, 91 percent white, generally hold college degrees, work a 36-hour week, earn less than people in the average job and work less than a full year at the job due to school vacations.

In the past the study of structural and individual-level explanations for achievement outcomes has been segregated into different camps of scholars. Structural factors have received attention from orthodox and "non-orthodox" economists, the latter including Marxist and dual, multiple and segmented labor market theorists. Such individual factors as socio-economic background, ability, and skills have been studied most extensively by human capital economists, the status attainment tradition in sociology, and the fields of vocational and personnel psychology. More recently these traditions have begun to inform one another (Wright and Perrone, 1977;

Robinson and Kelley, 1979; Stolzenberg, 1975, 1978; Sorensen, 1977; Beck, Horan and Tolbert, 1978; see review by Kalleberg and Sorensen).

The concept, career line, provides a useful vehicle for merging the structural and individual-level traditions still further. Spilerman (1977:586) notes that career lines "...constitute an intermediary structure, relating the behaviors and life chances of individuals to 'macro' organizational units, thereby linking two important levels in sociological analysis." Career lines are a structural feature of the labor market. Individuals, then, pursuing their own careers through sequences of jobs, follow identifiable career lines in the labor force with empirical regularity. The rate at which individuals move through career lines, i.e., normatively faster or slower in age terms, undoubtedly varies with both individual factors (ability, credentialing, on-the-job acquisition of skills and experience) and structural forces (the rate of growth of the occupational and opportunity structure (Sorensen, 1977); the size of continguous birth cohorts competing for similar positions, or the vacancy rate in firms and families of industries (White, 1970)). Thus, the study of career lines embraces an analysis of the differential impact of person-level explanations within a differentiated opportunity structure.

A promising line of structural investigation originates in the sociology of labor markets (Kalleberg and Sorensen, 1979). Dual and segmented labor market perspectives emphasize the division of the economy into two or more noncompeting groups, primary and secondary (also, core and periphery; monopoly, competitive and state sectors). Some perspectives emphasize occupational divisions, others suggest divisions along industry lines and yet others propose that firms are the maximally differentiating unit of social organization (Baron and Bielby, 1979). The issue awaits empirical

resolution (Wallace and Kalleberg, 1979). Formed and patterned by custom and institutional arrangement, it is argued that the primary sector provides high paying jobs with opportunities for advancement, employment stability, and good working conditions. Secondary sector jobs, by comparison, provide few opportunities for investments in work skills and on-the-job training, involve much more competition for employment, carry higher turnover rates, are characterized by employment insecurity and poorer working conditions. More important for our purposes, many of the jobs in the primary sector are linked together, which provides a necessary condition for certain types of career lines (Doeringer and Piore, 1971; Piore, 1975).

Career lines provide a conceptual and measurement device for testing and informing theories of economic segmentation. To our knowledge, this central tenet of the dual labor market literature, the hypothesis of qualitatively different job ladders and ports of entry, has not been thoroughly tested for a comprehensive population or for a highly disaggregated set of jobs. Are career lines in fact organized in two homogeneous groups? Alternately, to what degree is there within-market heterogeneity in career lines, i.e., transition probabilities, ports of entry and job characteristerics associated with career lines? Are there career lines that bridge the internal and external labor markets? To what degree are career lines organized within and across firms, industries, and occupations? Theories of market segmentation suggest answers to these questions, yet the state of the evidence is unsystematic and largely specific to studies of single firms, industries or occupational arenas (see review by Kalleberg and Sorensen, 1979).

What kinds of meaningful empirical variations might be expected in career lines and career content characteristics as a function of economic segmentation? Table 2 provides an initial set of hypotheses. We classify all origin positions in terms of the percent of its incumbents located in

TABLE 2 ABOUT HERE

core industries. The operational definition of sectors is taken from Beck, Horan, and Tolbert (1978), and more generally from Averitt (1968) and Bluestone et al. (1973). The periphery sector includes census industries of agriculture, forestry and fisheries, retail trade, business and repair services, personal services, entertainment and recreation services, select durable manufacturing industries (lumber and wood products except furniture, fixtures, and miscellaneous) and select nondurable manufacturing industries (food and kindred products, tobacco, textile mill products, apparel, leather, and not specified nondurable manufacturing). The core section contains all other industrial locations. Across all origin positions an average of 68 percent of incumbents are in the core sector (see Table 1, last item). Elementary school teachers by definition are all located in the core sector. Fifty-eight percent of origin positions contain $\geq$ 75 percent core incumbents and 20 percent of the origin positions contain $\geq$ 75 percent peripheral industry incumbents.

We define two additional measures that have not yet been discussed. First, D^*_i is the number of different 1970 destinations from each 1965 origin category, standardized per 100 respondents. It is a measure of the number of job options available five years later. Second, D^2 represents a multivariate distance measure (Mahalanoibis D^2; see Timm, 1975) defined on

the basis of a set of skill indicators taken from the job characteristics, and generated for all transitions from a career line to an entry portal for another career line. It is a summary measure of the goodness of fit of the set of job characteristics in one career line with the job characteristics of a new entry portal. We reason that career lines located in the core sector hold greater likelihood of staying in the line, more so with age. Earnings, employment stability, general educational development, specific vocational preparation, overall job status, and levels of involvement with data and with people should be higher in core sector career lines. By comparison, periphery sector career lines will reflect less well-articulated mobility options, greater work with things, more routinization, more females and nonwhites. Finally, core sector career lines should be characterized by high skill generalizability (D^2) and low diffuseness of destinations (D^*_i) while periphery sector lines should show the opposite.

In summary, our search for meaningful structural variations in the full set of career lines will begin with hypotheses from literatures on economic segmentation. One of the goals is to search for a small number of meaningful types of career lines. The search will include examination of classic notions of professional and craft types of careers. The study of structural and dimension variations in career lines will serve as a basis for operationally defining the access to lines that vary across individuals, particularly during the first decade following high school.

Determinants of Individual Access to Careers

We defined career lines as empirically occurring regularities in job sequences that affect significant numbers of workers over their work histories. We have emphasized that career lines are structural phenomena.

They describe the changes and stabilities in the jobs of men and women over the life course as these are formed by institutional and labor market structures. A second major component of our research agenda investigates how individuals gain access to careers through entry portals over the ages eighteen to thirty.

Career entry and development occur within two time frames. First of all, career options, their flexibility and outcomes, change and develop over the life course. Consideration of the determinants of access to career lines must, therefore, take into account developmental time by drawing upon prior career experiences, one's human capital investments, and the interplay of family and possibly military life course dimensions as these affect careers. Our discussion of determinants takes into account both the early life course and the ongoing determinants of career variation over the transition years, ages eighteen to thirty. During this period one is likely to complete schooling, perhaps enter military service, marry or choose to remain single, perhaps establish a family and, importantly, experience a large number of job changes (Sommers and Eck, 1977).

Second, the determinants of career line entrance also occur relative to historical time and place. For example, it may be reasonable to expect that the military experience for Vietnam veterans has different career consequences than it does, say, for World War II veterans. The difference in outcomes may be due to historical variations in the size of birth cohorts that affects job availability. While our data and study design permit only limited statements about historical variations, the questions of career determinants will be informed by the scope conditions imposed by historical time.

Our design for examining the determinants of careers draws upon an array of personal, social psychological, and social structural factors as these occur and are sequenced primarily in the second and third decades of life. Because of their policy and theoretical relevance, greater attention will be given to certain classes of explanation that are framed by two questions:

1. How and to what extent do individual differences--including gender, residency, social psychological orientations, and investments in different forms of human capital--determine one's access to careers?

2. How does the interplay of major life course dimensions (family, education, and military) structure male and female access to careers?

Each question embodies not only a class of explanations but also a sensitivity to the occurrence of the particular determinants in the life course. Our consideration of variables, as does our discussion of analytical strategies, gives prominence to their life course location and sequencing. In the sections that follow we identify the issues that relate to the four question areas.

Dependent variables. Our program of research on careers emphasizes two components: on the one hand, concepts, measures, components and structure of career lines in the American economy; and, on the other hand, individuals and the way their own career histories evolve, particularly in the late second and early third decades of their lives. In terms of an analogy, the first component builds a very detailed road map, charting the explicit linkages between the avenues of job movement, measuring the traffic flow through job transitions as it were. The roads and avenues exist prior to an individual's work history. Rather, individual work histories more or less conform to the prior network of age-graded career lines.

The second component seeks to investigate how individuals gain access to and take positions in the larger network of career lines. Who goes where, how and why? To continue the analogy, individuals are like cars moving in the variegated and complex yet systematic ways that traffic patterns flow through a system of roads. Taken alone, either component potentially is a worthwhile and instructive way of studying careers. Yet, the more insightful research may lie in the marriage of the two components, for this would inform the study of careers concerning both variations in social structure and variations among individuals.

One way the explicit linkage of the two components can be accomplished is through the generation of career line dependent variables that might operationally define access to types of career lines and can be modeled and explained with independent variables from the individual-level data. Specifically, dependent variable scores for age-specific entry portals (18-22, 23-27, etc.) will be generated. The scores will be merged to data records of individuals on the basis of the jobs they have held and hold. Finally, the variation in the dependent variable scores will be modeled.

While the definition of actual dependent variables awaits the results generated in the career line analysis, it is possible to speculate about some possibilities. Obvious options include the career line content characteristics for each entry portal consisting of the expected work role content and rewards over the life course measured by a weighted average of scores based on each age-specific origin position. The sheer number of career lines or flexibility flowing from origin positions and the likelihood of remaining in a single career line over time may prove to be interesting and informative dependent variables.

One can envision the following line of analysis. Suppose the search for structure in career lines reveals three or four basic types. Moreover, the probability of ever entering or remaining in each type, given location in an age-specific job, can be estimated for all age-specific job categories. When merged to individual data records these probabilities are one type of measure of access to career lines. Defined as such, which characteristics of individuals, their life situations and histories, best predict access to types of careers? We develop our thinking on these questions in the sections that follow.

Person level explanations. Our analysis of career determinants is most accurately described as exploratory, a circumstance underscored by the proposed conceptualization and operationalization of the dependent variable. There are, however, suggestive hypotheses gleaned from the literature that inform our inquiry. Two considerations must be emphasized in discussing these. First, in context these hypotheses are invariably advanced as explanations for single time measures of occupational choice or attainment. We propose to examine whether the explanations also apply to careers. Second, rather than embrace a monocausal explanation of career determinants, our strategy is to examine classes of effects within the context of more broadly specified models.

An important set of predictors is drawn from the human capital literature. Of the many possible forms of human capital none has received more attention over the past two decades than the economics of education (Becker, 1975:1). The implicit hypothesis with respect to time point estimates of occupational prestige and earnings is that returns are a function of educational investments; but how the investment/return formula applies to careers has not been examined (but see Featherman, 1973; Kelley,

1973). There is a need, then, to examine the career implications of kinds of educational investments including curriculum, level of formal education, vocational and apprenticeship programs, on-the-job training, and the like.

A variant of the human capital literature is the thesis that individuals have differential access to educational investment opportunities. Rather than assume homogeneity of educational experiences within schools (Bowles and Levin, 1968; Jencks et al., 1972), Heyns' 1974 thesis is that differences in schooling outcomes are due to differential access to and utilization of resources within schools. The within-school explanation incorporates elements of the human capital argument, that school investments maximize returns, and features the argument of Bowles and Gintis (1976), that school resources are differentially allocated by social status. Alexander and McDill (1976) provide qualified support for the thesis that sorting and selecting processes are implicated in both the educational and societal stratification systems. Alexander, Cook, and McDill (1977) report additional support but, from the same analysis, provide evidence that the major determinants of curriculum are meritocratic.

There is, then, continuing ambiguity, theoretical and empirical, concerning the effect of school-related human capital investments--including resources operationalized as curricular, extracurricular and significant other influences--on such school outcomes as single time measured achievement aspirations and attainments. The ambiguity of returns to investments in individually acquired capacities or credentials is further confounded in the case of explaining access to career lines, which has not been examined in the literature. The fundamental question is whether investments in school-related human capital affect careers in ways different from the ways

they affect occupation and earnings attainments measured at a single point in time. The aggregate occupation status returns to years of schooling are well documented (Featherman, 1971, 1973; Kelley, 1973) and the earnings returns have been extensively studied (see reviews by Eckaus, 1973; Mincer, 1974; Becker, 1975; Haller and Spenner, 1977). But the relevance of these point estimates for careers, defined as job sequences, is unexamined.

Schooling and related forms of human capital affect careers in at least two ways. First, the acquisition of monopsonistic skills, knowledge, and credentials that are specific to a narrow range of work role applications will undoubtedly constrain the range of one's career options, on the one hand, while greatly enhancing the probability of following a specific career line, on the other. Thus, specialized training and credentialling--for example, surgery--may be viewed as a kind of human capital that is likely to restrict career options and transfer ability. Other kinds of training and skill acquistion--for example, interpersonal skills--may be more generalizable to a variety of potential career lines. For example, a liberal arts education may provide career line flexibility although its effect on single point-in-time measures of occupations and earnings may be modest. Moreover, certain types of high school curricula such as vocational education programs, while promoted as "relevant" job training and intended to relieve youth unemployment, may operate counter-productively by restricting an individual's career line options. What enhances the prospect of immediate employment in a single career line may be detrimental if that line of employment or sector of the labor market is characterized by high turnover rates. Empirical evidence is needed on the career implications of various kinds of curricula, vocational and apprenticeship training

programs, extracurricular activities including part-time work experience and other non-school activities, and knowledge of the world of work.

While informed by the literature on human capital the study of careers is not limited to the human capital perspective to explain how individual characteristics differentiate access to career lines. Thus, experience in jobs in primary or core sectors of the labor market early in the life course may yield substantial increments in access to certain types of career lines. Moreover, experience in secondary labor market jobs (which might not constitute a career line; see Spilerman, 1977) or in career lines laden with secondary jobs may foreclose access to career lines because of the institutional barriers surrounding the secondary sector (Doeringer and Piore, 1971: Reich, Gordon and Edwards, 1973).

The structure of society and local communities also defines the availability of careers in a number of ways. In entering the labor force individuals encounter a community and regional occupation-industry-firm mix that defines the opportunity structure to which they have access (Sewell and Orenstein, 1965; Spilerman and Habib, 1976; Mueller, 1974; Blau and Duncan, 1967; and Hogan and Featherman, 1977). An examination of several variables should enhance the understanding of individual access to careers. The variables include reasons for staying in or moving from communities-of-origin and communities-of-residence, community location and size during early years of employment; and an individual's current willingness and ability to migrate for career-related reasons.

Human capital concepts may have little explanatory power in these contexts. Although labor market theories tend to address ways in which career lines are structured as opposed to explaining access to them, these

perspectives will also be used where they inform the study of career-line entry.[5]

Another literature is represented by Bowles and Gintis (1976) who argue that schools fail to function as the great equalizer among individuals and that the educational system is an instrument of class interest. They insist that educational systems reflect, indeed, contribute to efforts to legitimate the social hierarchy and to the exploitative division of labor which characterizes the larger society. Whereas the human captial perspective emphasizes the direct effect of such investments as education on outcomes, the Bowles-Gintis argument emphasizes the role of formal education as an intervening variable in the intergenerational transmission of social economic advantage. The Bowles-Gintis position raises two questions for the proposed analysis: what aspects of background, including ascribed statuses in social economic origins, affect access to career lines? What are the mechanisms by which the effects are transmitted?

An equally prominent line of person-level explanations suggests that individual interests, aspirations, and motivations--"ambitions," generically speaking--differentiate those who enter careers (for a review see Spenner and Featherman, 1978; Holland, 1973; Temme, 1975:21-37). However, these explanations tend to provide only modest determinants of single-point estimates of occupational achievements and it is doubtful that they will prove to be dramatically more powerful determinants of multi-dimensionally conceptualized work roles and careers over time. It is, nonetheless, appropriate to examine the matrix of achievement orientations or ambitions

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[5]See Spilerman, 1977:590, note 35, for analytical suggestions for handling these effects in earnings equations.

as they might explain access to careers of a given type and quality. The correlates include aspirations and expectations for careers, locus of control, self-esteem, future orientation, delay of gratification, competence, intelligence, and intrinsic-extrinsic motivations. Thus, measures of school-related human captial credentials should be complemented by a broad range of psychological and social psychological indicators which, together, tap an array of person-level explanations for differential access to career lines.

The interplay of life-course dimensions. As families are formed, as individuals move between family, school, work, and the military, their career interests, needs, and options likely change. The interplay of life-course dimensions is especially complex during the transition years from completion of high school through approximately age thirty. How does the interplay of major life course events affect access to career lines?

Each life-course dimension--work, school, family and military--hosts a variety of identifiable events. A major assumption undergirding most models of social processes is that the events are normatively timed and sequenced (Glaser and Strauss, 1971; Winsborough, 1975). However, there is a literature emphasizing the detrimental effects of asynchronies (Bartz and Nye, 1970; Bumpass and Sweet, 1972; Hogan, 1976). Given the many possible permutations in the ordering of events within and between life-course dimensions, we join with Sweet (1977) in questioning the assumption of a single life-course model.

The probable effect of level and kind of education on careers was considered from the human capital perspective above. Consideration also needs to be given to issues of education duration, interruptions, and reentry as these affect careers. Featherman and Carter (1976) report that

discontinuities in educational attainments are largely independent of background characteristics, but the nature and extent of the effects on careers is not known. The increasing number of individuals returning to school for retooling or basic adult education (Grant and Lind, 1976) underscores the life-long nature of the education-to-work and work-to-education transitions (Featherman and Carter, 1976:136-137). The conditions for and consequences of these transitions are not understood, nor is the affect of leaving school without certification.

While it has been asserted that military service provides opportunities for continuing education and learning a trade, the literature generally suggests that military service has negative effects on men's futures (Cutright, 1974), although the consequences of military service for careers are not documented. Whether military involvement has an effect on access to careers net of that due to schooling interruption, the effect of curtailment or unanticipated and involuntary transitions in the life course has not been investigated.

The timing of educational investments and employment for one's spouse may dramatically affect the timing and sequencing of education and employment for the other. For husbands, wife's employment or inherited wealth may facilitate continuation in post-secondary education thereby affecting his career. Waite (1976), for example, reports that a wife's wage potential has its greatest effect on her labor force participation in a period between marriage and birth of the first child. Therefore, when the wife is employed, husbands enrolled in post-secondary education should experience fewer schooling interruptions or terminations prior to the birth of the first child. The wife's reentry into the labor force after the birth of the first child may structure the timing and sequencing of the

husband's education and work transitions permitting him to reenter school, hence restructure his access to careers. For females, the timing and sequencing of husband's career may substantially define her career behaviors and options. A wife's job opportunities are much more likely to be affected by the husband's job opportunities than vice versa. We know relatively little about the differentiating and integrating processes that affect husband's and wife's careers under more and less traditional family structures and definitions of the family division of labor.

In their monograph on how women contend with career contingencies, Angrist and Almquist (1975) argue that women choose a life style rather than an occupation or career. Only after assigning priorities to education, work, fertility expectations, and family might the question of pursuing a particular line of work become a relevant issue for women.

Recent contributions to this area of research have been offered in a series of papers by Waite and Stolzenberg (Waite, 1976; Waite and Stolzenberg, 1976; Stolzenberg and Waite, 1977) who developed a basic reduced form structural model of labor force participation plans and fertility expectations for women. Adjusting for background, they report that work plans determined fertility expectations to a much greater extent than the latter determines the former. In support of their "learning hypothesis," they note an increasingly negative effect of work plans on fertility expectations across successive cohorts of older women. Waite and Stolzenberg reason that as women age their knowledge about the labor force increases as does their knowledge about the detrimental consequences of interruptions on labor force participation. The hypothesis is tested indirectly but points to the larger issue, as the authors note, of the need

for better specifications of the ways work experience defines forms of familial behavior and vice versa.

We suggest that it may be the content of one's prospective careers that operates as the crucial factor in linking work experience with familial behavior. Analysis is required that examines how the accessibility and content of male and female career options are restricted, given particular familial circumstances. To accomplish this, research is needed to analyze how men and women combine and coordinate their education, prior work experience, work plans, fertility experiences and plans, and related family considerations (Otto, 1979). Such analysis will extend considerably beyond earlier research that typically focused on gender differences in work plans and in labor market experiences.

Finally, spouse's sex-role ideology as expressed in attitudes toward education, labor force participation, and psychological support may influence career outcomes beyond the effects of timing and sequencing. With respect to wife's reentry to college, Tittle and Denker (1977) suggest that a major barrier is husband's and relatives' attitudes. This argument has also been applied to wife's labor force participation. Certainly, a wife's orientations may also affect the husband's education and job behavior. For example, a major barrier to husband's returning to school may be the wife's attitudes toward the disruption of a stable household. The extent to which the attitudes of a spouse affect education and career decisions for both males and females represents a major intervening process controlling access to careers that is not well understood.

Several data limitations have inhibited understanding how people manage their educational, occupational and familial careers. First, the causal ordering between events such as education, age at marriage, birth of first

child and occupational experience, is often ambiguous. Commonly, measures reference only the first and last occurrence of such events. For example, most major data sets incorporate measures of first job upon completion of education and measures of current job. Similarly, education is measured as the highest level of regular schooling, whenever that occurred. The incidence but generally not the timing of interruptions in education usually is typically recorded. Such partial histories do not record the necessary detail for analyzing the complex interplay of life-course dimensions. Second, most major data sets focus on jobs or education but give limited if any attention to military and family events. Detailed information on at least these four dimensions is required to adequately address the issues. Third, the sampling frames in most data sets used in analyzing life-course events typically include a large number of age cohorts. While this permits comparative analyses, the restricted number of cases in each cohort generally limits the extent to which synchronies and asynchronies can be examined. Fourth, individuals' prior attitudes are often retrospectively measured. A major pragmatic problem with retrospectively gathering background characteristics is the lack of interview time to gather measures of all relevant antecedent variables.

With few exceptions (e.g., the Social Accounts Data; Blum, Karweit and Sorensen, 1969; Rogoff, 1975), there are no large longitudinal or cross-sectional data sets that permit an unambiguous causal ordering of the sequencing, timing, and interplay of family events with related life-course events. While the Social Accounts Data are useful, these data reference only the life histories of males, do not measure family events with precision, and provide only limited retrospective background information. Recognizing the limitations in existing data, researchers have recommended

gathering more extensive and detailed longitudinal life histories (Hogan, 1976:136; Ryder, 1978:9).

Our own research has focused on adolescent to adulthood transitions. We have initiated and are currently completing gathering the second wave of 13-year interval panel data providing detailed occupational, educational, familial and military histories from 6,795 young men and women now aged 28 to 30. These data are described in the following section.

Design and Data for Individual-Level Measures

Analysis of the determinants of individual access to career lines and of the interplay of life course dimensions requires extensive individual-level data. Whereas career lines were generated on the basis of the census public use sample described above, our source for the individual-level measures is an in-hand 13-year panel study of a statewide random sample of nearly 7,000 early career males and females.

Time one data were gathered from juniors and seniors enrolled in a sample of public high schools in the State of Washington in 1965-66. A stratified random sample of high schools was drawn based on the number of junior and senior students enrolled and the proportionate number of schools with the same level of enrollment. All juniors and seniors in selected high schools were included in the study sample. Using estimates of school enrollment at the time of the survey, the overall response rate across both forms was 86 percent (N = 6795). Approximately 20 percent of the students who completed the questionniare were selected for more detailed study. These students went through an additional interview procedure; their mothers or fathers (randomly selected) received a mail-back questionnaire; the student counselors were asked to complete a brief questionnaire; and

information concerning high school grades and IQ scores was excerpted from school records.

The respondent data for both males and females compares favorably with state and national population characteristics on a number of demographic variables including father's occupations, father's education, and father's place of residence. While reflecting the state and regional small non-white population, the race composition of the sample is a point of noncomparability for national comparisons. About 2 percent of the study respondents are non-white as compared with 11 percent in the nation. Inferences based on race, therefore, cannot be made from this data. However, bivariate and multivariate statistics derived from the data for models of the aspiration formation process are very similar to those based on other regional and national samples (Sewell and Hauser, 1975; Alwin, Otto, and Call, 1976; Otto and Haller, 1978). Three other characteristics of the data are that the sampled population is widely generalizable, includes approximately equal numbers of males and females, and the data include extensive social psychological and background information on respondents during late adolescence. The wave 1 instruments provide detailed information on personal characteristics, educational plans, high school activities, teacher plans, attitudinal measures, occupational plans, background characteristics, and characteristics of close friends.

We reestablished contact with over 98 percent of the original 1966 respondents. Data collection for the 13-year follow-up involved three major sources: a telephone interview, a mail-back questionnaire, and high school records. In 1979 telephone interviews were conducted with over 89 percent of the non-institutionalized 1966 respondents. An additional 7 percent of overseas or no-phone respondents are being surveyed by mail.

The telephone interview averaged forty minutes and gathered detailed information on family, education, work, and military histories through age 30. The interviews were conducted using computer driven interview schedules displayed on CRT consoles to facilitiate rapid movement through the complex life-histories and efficient coding of fixed responses.

About two weeks after the telephone interview a follow-up mail-back questionnaire was sent to each respondent who completed the telephone interview. At this date about 80 percent of the questionnaires have been returned and entered on computer files. We estimate that upon completion the mail back response rate will approximate 85 percent. Information gathered in the follow-up questionnaire includes various work related questions, attitudinal measures, family related questions, and personal characteristic questions.

The follow-up questionnaires included forms authorizing release of individual high school records. The records include each respondent's entire course list, grades, credits, days present and tardy on a semester by semester basis, scores on standardized achievement tests and mental ability measures. To date, 95 percent of the respondents have released their high school records.

The respondent data is well suited for the individual-level analyses suggested in our earlier discussion. In addition to providing the necessary information for ascertaining the determinants of access to career lines and the interplay of life-course dimensions, the individual-level data provide the opportunity to conduct a limited examination of the validity of the career line information presented above.

FIGURE 1

FIGURE 1A

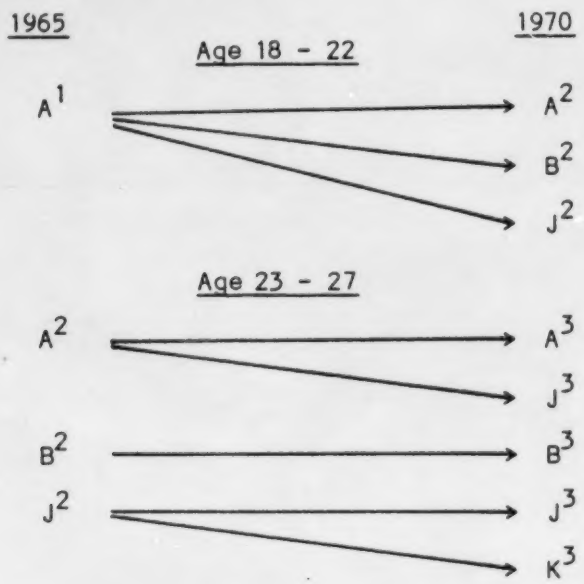


FIGURE 1B

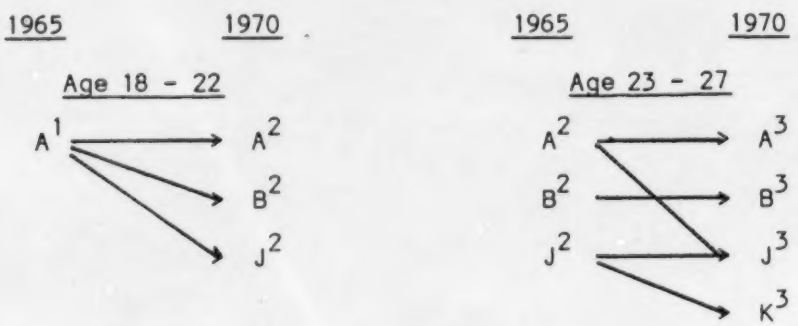
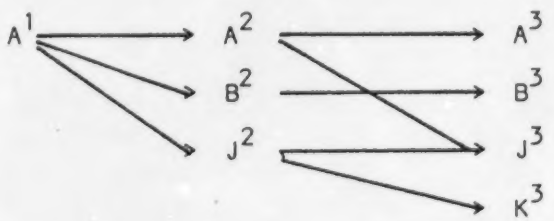


FIGURE 1C



Age 18 - 22 23 - 27

*Figure 1 graphically illustrates the construction of a set of synthetic career lines. The letters (A, B, J and K) represent hypothetical job categories.

Figure 1A displays hypothetical information for 1965 to 1970 job transitions for one origin job, A^1, for the cohort aged 18 to 22 and for three jobs--A^2, B^2 and J^2--for the cohort aged 23 to 27.

In Figure 1B the rearranged display presents the beginnings of a set of synthetic career lines. We reposition the transitions for the cohort aged 23 to 27 to appear horizontally and in temporal sequence. The resulting career lines are synthetic inasmuch as the transition probabilities are estimated from two different age cohorts based on job reports for 1965 and 1970 rather than probabilities at two five-year intervals for the same cohort.

In Figure 1C we simplify the graphic presentation and present the form used in our subsequent examples. The same procedures for joining the transition probabilities of the cohorts aged 23 to 27 with those for the cohort aged 18 to 23 are followed with the remaining cohorts to produce a complete set of career lines originating with job A in the age 18 to 22 cohort and extending through the age 53 to 57 cohort.

FIGURE 2: CAREER LINE SETS FOR ELEMENTARY SCHOOL TEACHERS

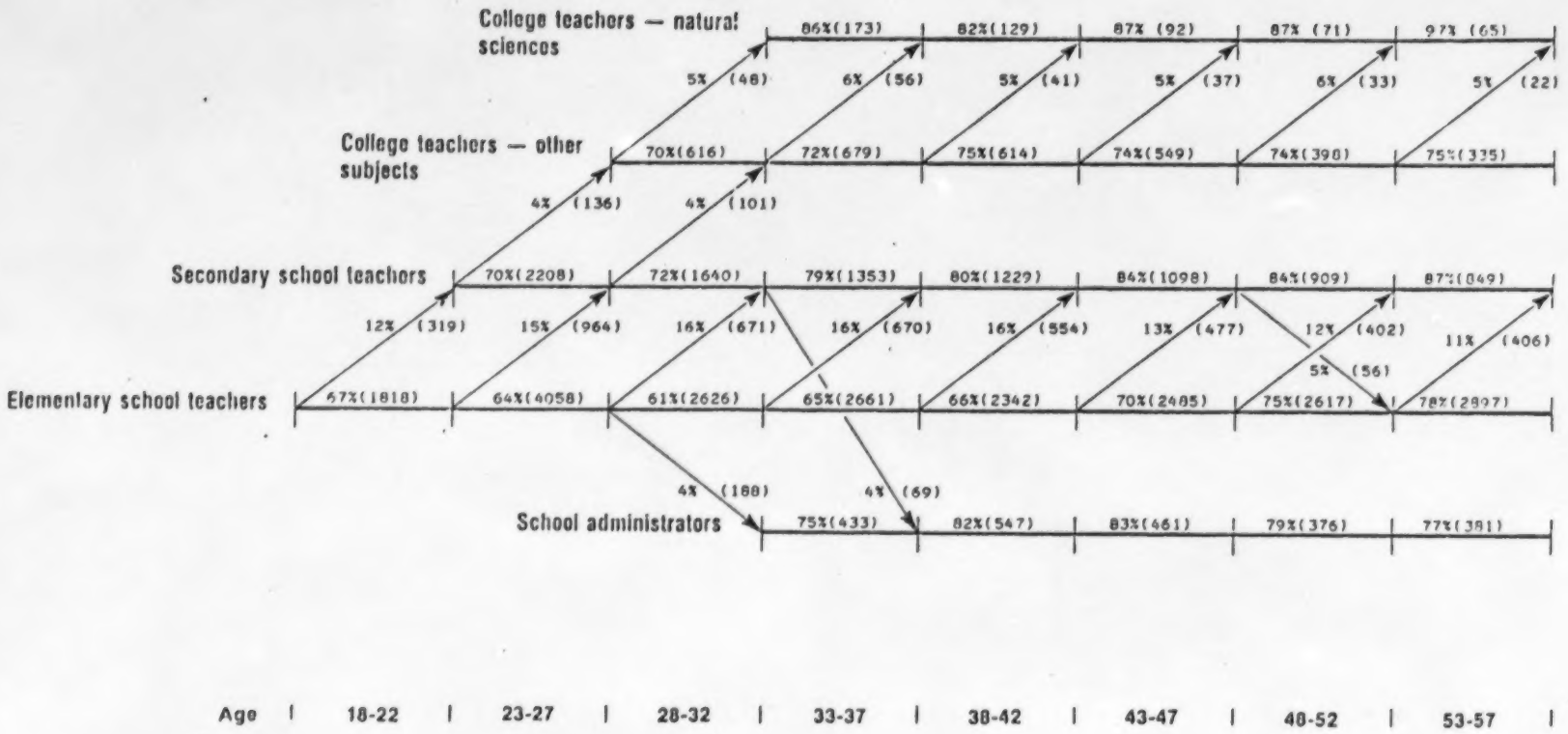


TABLE 1

JOB CHARACTERISTICS FOR 1970 CENSUS ELEMENTARY SCHOOL TEACHERS, AGE 23-62

CHARACTERISTIC	SCORE	US LABOR FORCE AVERAGE	METRIC - RANGE
DICTIONARY OF OCCUPATIONAL TITLES			
LEVEL OF INVOLVEMENT WITH DATA	1.97	3.97	0(HIGH) - 8(LOW)
LEVEL OF INVOLVEMENT WITH PEOPLE	2.01	6.67	0(HIGH) - 8(LOW)
LEVEL OF INVOLVEMENT WITH THINGS	8.00	5.42	0(HIGH) - 8(LOW)
INTELLIGENCE	2.00	2.76	1(HIGH) - 5(LOW)
VERBAL	2.00	2.90	1(HIGH) - 5(LOW)
NUMERICAL	2.93	3.14	1(HIGH) - 5(LOW)
SPATIAL	3.03	3.34	1(HIGH) - 5(LOW)
FORM PERCEPTION	3.05	3.15	1(HIGH) - 5(LOW)
CLERICAL PERCEPTION	2.13	3.26	1(HIGH) - 5(LOW)
MOTOR COORDINATION	3.93	3.36	1(HIGH) - 5(LOW)
FINGER DEXTERITY	3.08	3.47	1(HIGH) - 5(LOW)
MANUAL DEXTERITY	3.07	3.34	1(HIGH) - 5(LOW)
EYE-HAND-FOOT COORDINATION	4.04	4.50	1(HIGH) - 5(LOW)
COLOR DISCRIMINATION	4.11	4.33	1(HIGH) - 5(LOW)
GENERAL EDUCATIONAL DEVELOPMENT	4.98	3.61	6(HIGH) - 1(LOW)
SPECIFIC VOCATIONAL PREPARATION	6.15	5.35	9(HIGH) - 1(LOW)
VARIETY	.90	.41	1(PRESENT - 0(ABSENT)
REPETITIVE SHORT CYCLE OPERATIONS	0.00	.30	1(PRESENT - 0(ABSENT)
SPECIFIC INSTRUCTION	0.00	.22	1(PRESENT - 0(ABSENT)
DIRECTION, CONTROL, PLANNING	.09	.22	1(PRESENT - 0(ABSENT)
DEAL WITH PEOPLE	1.00	.41	1(PRESENT - 0(ABSENT)
WORK ALONE	0.00	0.00	1(PRESENT - 0(ABSENT)
INFLUENCE PEOPLE	.05	.09	1(PRESENT - 0(ABSENT)
PERFORM UNDER STRESS	0.00	.03	1(PRESENT - 0(ABSENT)
EVALUATE-SENSORY, JUDGMENTAL	.97	.24	1(PRESENT - 0(ABSENT)
EVALUATE-VERIFIABLE CRITERIA	0.00	.35	1(PRESENT - 0(ABSENT)
INTERPRETATION-FEELINGS, IDEAS, FACTS	.01	.02	1(PRESENT - 0(ABSENT)
ATTAIN PRECISE STANDARDS	.00	.42	1(PRESENT - 0(ABSENT)
LIFT, CARRY, PUSH, PULL	2.00	2.25	1(SEDENTARY) - 5(VERY HEAVY)
CLIMB, BALANCE	.01	.13	1(PRESENT - 0(ABSENT)
STOOP, KNEEL, CROUCH, CRAWL	.01	.25	1(PRESENT - 0(ABSENT)
REACH, HANDLE, FINGER	.07	.80	1(PRESENT - 0(ABSENT)
TALK, HEAR	.99	.48	1(PRESENT - 0(ABSENT)
SEE	.02	.52	1(PRESENT - 0(ABSENT)
INSIDE, OUTSIDE	1.03	1.44	1(INSIDE), 2(OUTSIDE), 3(BOTH)

CHARACTERISTIC	SCORE	US LABOR FORCE AVERAGE	METRIC - RANGE
EXTREMES OF COLD	0.00	.01	1(PRESENT - 0(ABSENT)
EXTREMES OF HEAT	0.00	.04	1(PRESENT - 0(ABSENT)
WET AND HUMID	0.00	.06	1(PRESENT - 0(ABSENT)
NOISE AND VIBRATION	0.00	.15	1(PRESENT - 0(ABSENT)
HAZARDS	0.00	.15	1(PRESENT - 0(ABSENT)
FUMES, ODORS, TOXIC CONDITIONS	0.00	.10	1(PRESENT - 0(ABSENT)
OVERALL SELF-DIRECTION OF WORK	21.42	10.11	-3(LOW) - 27(HIGH)
U.S. CENSUS			
SEX COMPOSITION	13	64	PERCENT MALE
RACE COMPOSITION	91	90	PERCENT WHITE
MARITAL STATUS	16	09	PERCENT SINGLE
MARITAL DISSOLUTION	03	04	PERCENT DIVORCED
CHILDREN	1.59	2.18	MEAN CHILDRNE EVER BORN
EDUCATION	15.31	11.46	MEDIAN YEARS SCHOOLING
HOURS WORKED	36.23	40.48	MEAN HOURS PER WEEK
SELF-EMPLOYED	0.00	08	PERCENT SELF-EMPLOYED
WORK 5 YEARS AGO	64	80	PERCENT WORKING
MILITARY 5 YEARS AGO	01	04	PERCENT MILITARY
COLLEGE 5 YEARS AGO	33	07	PERCENT COLLEGE
WORK 40-47 WEEKS PER YEAR	27	08	PERCENT WORKING
WORK 48-49 WEEKS PER YEAR	04	06	PERCENT WORKING
WORK 50-52 WEEKS PER YEAR	22	69	PERCENT WORKING
JOB EARNINGS	5178	6866	MEAN DOLLARS
JOB EARNING	5705	6391	MEDIAN DOLLARS
TOTAL PERSONAL INCOME	5981	6610	MEDIAN DOLLARS
AGE AT FIRST MARRIAGE	23.27	22.95	MEAN AGE
VOCATIONAL TRAINING	13	27	PERCENT
VOCATIONAL FIELD-BUSINESS	24	29	PERCENT
VOCATIONAL FIELD-NURSING	07	07	PERCENT
VOCATIONAL FIELD-ENGINEERING, SCIENCE	03	09	PERCENT
VOCATIONAL FIELD-TRADES, CRAFTS	12	45	PERCENT
VOCATIONAL FIELD-AGRI, HOME ECON	06	04	PERCENT
PARTIAL DISABILITY	04	10	PERCENT
TOTAL DISABILITY	01	03	PERCENT
DURATION OF DISABILITY	4.99	5.28	MEAN YEARS
DISABLED WITH LONG-TERM DISABILITY	29	31	PERCENT OF DISABLED
STATE OF RESIDENCE-SOUTH	30	30	PERCENT SOUTH
STATE OF RESIDENCE-WASHINGTON	01	01	PERCENT WASHINGTON
CORE SECTOR OF ECONOMY	100	68	PERCENT CORE

TABLE 2

CAREER LINES: TESTS OF DUALISM, HYPOTHESIS STRUCTURE**

DEPENDENT ATTRIBUTE	SECTOR	
	CORE	PERIPHERY
1. Transition Probabilities		
P_{ij} $(i = j)$	High	Low
P_{ijk} $(i = j)$	Convex with age	Flat with age
2. Diffuseness of Destinations (D^*_{ik})	Low	High
3. Earnings	High	Low
Earnings by age	Convex	Flat
4. Employment Stability	High	Low
Employment Stability by age	Convex	Flat
5. General Educational Development	High	Low
6. Specific Vocational Preparation	High	Low
7. Data	High	Low
8. People	High	Low
9. Things	Low	High
10. Routinization	Low	High
11. Closeness of Supervision	?	?
12. Sex Composition	Male	Female
13. Race Composition	White	Nonwhite
14. Skill Generalizability (D^2)	High	Low
15. Overall Job Status	High	Low

**Overall Contrast: For 15 dependent attributes most variance should be between rather than within sectors.

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